



# Critical Thinking

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# Think for Yourself

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A library may be very large; but if it is in disorder, it is not so useful as one that is small but well arranged. In the same way, a man may have a great mass of knowledge, but if he has not worked it up by thinking it over for himself, it has much less value than a far smaller amount which he has thoroughly pondered. For it is only when a man looks at his knowledge from all sides and combines the things he knows by comparing truth with truth, that he obtains a complete hold over it and gets it into his power. A man cannot turn over anything in his mind unless he knows it; he should, therefore, learn something; but it is only when he has turned it over that he can be said to know it.

Arthur Schopenhauer: [On Thinking for Oneself](#)



# What is "Critical" in Critical Thinking?

**κριτικός** (Kritikos), relating to judging, fit for judging, skilled in judging, able to discern (Plato, Plutarch, Lucian, others). With the genitive of the object, for example:  
κριτικός ἐνθυμήσεων καὶ ἐννοιῶν καρδίας - able to judge the thoughts and intentions of the heart.



**Mechanical Thinking**  
(statements that stop thought)



**Critical Thinking**  
(questions that start thought)

"I'm not good at math."

"How can I improve my math skills?"

"That's not the way Mrs. Jones taught us."

"How many ways are there to do this?"

"There was only one reason for the Civil War."

"What different factors led to the Civil War?"

"Current Events is boring."

"How do events right now shape my future?"

"Our group never accomplishes anything."

"Why is our group getting hung up?"

# What is "Critical" in Critical Thinking?

## Definition of critical

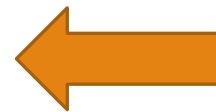
b :crucial, decisive a critical test

c :indispensable, vital a component critical to the operation of a machine

d :being in or approaching a state of crisis a critical shortage

a critical situation

2 a :inclined to criticize severely and unfavorably



**Not** what we mean by "critical" in critical thinking

b :consisting of or involving criticism critical writings

; also :of or relating to the judgment of critics The play was a critical success.

**c :exercising or involving careful judgment or judicious evaluation**



What we mean by "critical" in critical thinking

# Critical Thinking Is:

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- Active
- Purposeful
- Skillful
- Responsible
- Self-Correcting
- Directed



# Attitude + Knowledge + Thinking Skills = Critical Thinking

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# Critical Thinking, Defined

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“All that we are is the result of what we have thought: it is founded on our thoughts and made up of our thoughts.”

— *Buddha, Dhammapada*

“Learning without thought is labor lost; thought without learning is perilous”

— *Confucius, Analects*

“The knowledge of anything, since all things have causes, is not acquired or complete unless it is known by its causes.”

– *Avicenna (Ibn Sina), On Medicine*

“Read not to contradict and confute; nor to believe and take for granted; nor to find talk and discourse; but to weigh and consider”

— *Francis Bacon, Of Studies*

“Don't take shadows too seriously. Reality is your only safety. Continue to reject illusion.”

— *Wole Soyinka, Critical Perspectives on Wole Soyinka*

# Critical Thinking, Defined

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“Critical thinking is the process of purposeful, reflective judgment. Critical thinking manifests itself in giving reasoned and fair-minded consideration to *evidence, conceptualizations, methods, contexts, and standards* in order to decide what to believe or what to do.”

*(Facione, 2010).*

“The intellectually disciplined process of actively and skillfully **conceptualizing, applying, analyzing, synthesizing, and/or evaluating information** gathered from, or generated by, *observation, experience, reflection, reasoning, or communication*, as a guide to belief and action” *(Scriven and Paul, 1987).*



# Critical Thinking: The Challenge of the Workplace

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“Proficiency in reading, writing, and arithmetic has traditionally been the entry-level threshold to the job market, but the new workplace requires more from its employees. Employees need to think critically, solve problems, innovate, collaborate, and communicate more effectively.”

— American Management Association, 2010 (quoted in Diane Halper: Thought and Knowledge, page 5.)

# Integrative Learning: Hart Research Associates Study, 2018\*

The learning priorities that executives and hiring managers value most highly cut across majors.

*Very Important\* Skills for Recent College Graduates We Are Hiring*



\* 8-10 ratings on a 0-to-10 scale; 15 outcomes tested

# The 4 C<sup>s</sup> of Employment Success

Critical Thinking

Curiosity

Collaboration

Communication



*What do these 4 traits have in common?* They are  
**Transferrable Skills.**

# Critical Thinking

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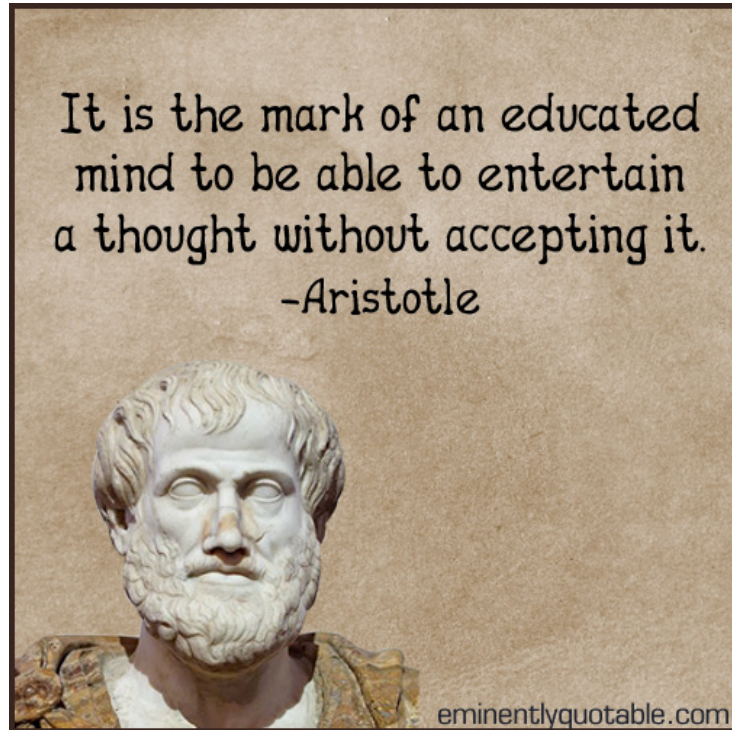
“All people by nature desire to know.”\*

Aristotle

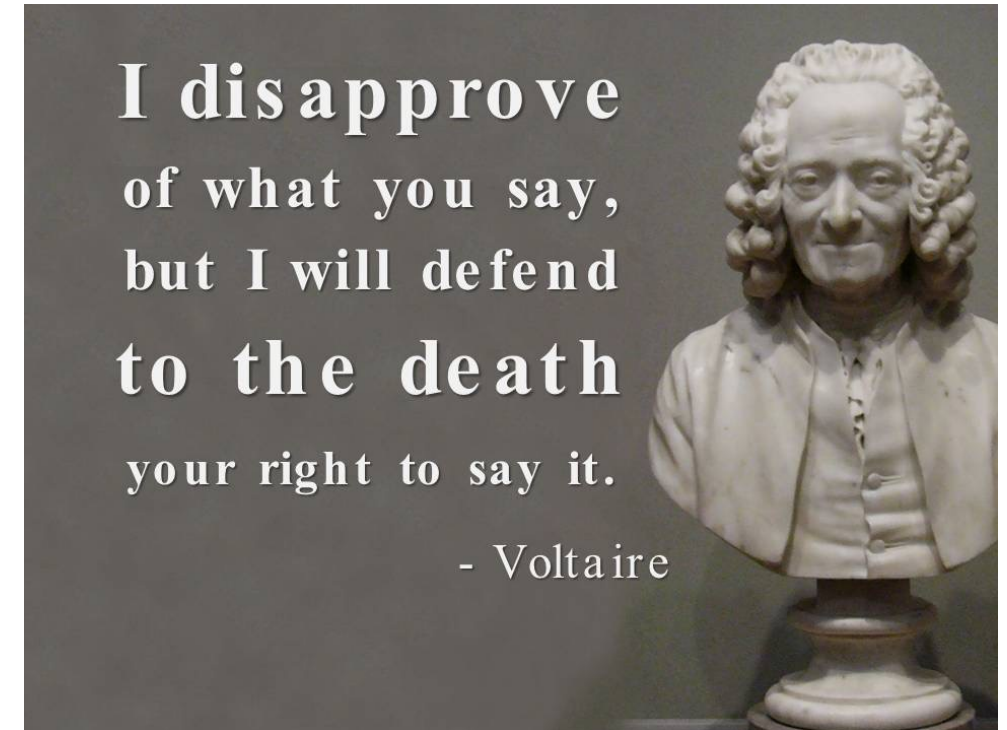
Metaphysics, Book 1,

\*πάντες ἄνθρωποι τοῦ εἰδέναι ὀρέγονται φύσει.

# Critical Thinking Is:



Aristotle never said this.



Voltaire never said this.

# Critical Thinking

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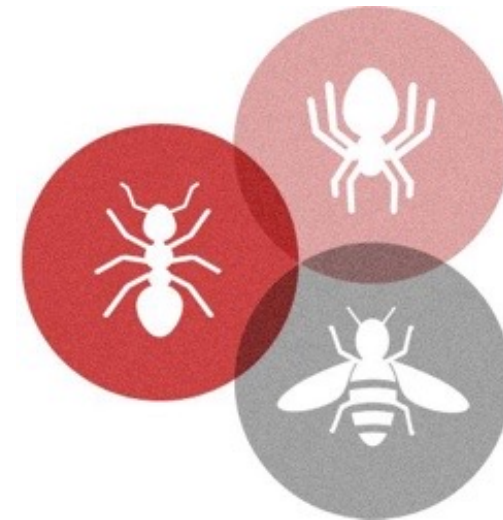
“By definition, science can never be settled. Consensus does not constitute truth. Indeed, every scientific theory, no matter how widely accepted or how often confirmed by experiment, always hangs by a thread. Only one prediction made by the theory that turns out not to be true is needed to negate it in part or in whole.”

John Steele Gordon, *“The Theory of Science”*, New Criterion, September 2023

# Francis Bacon's Famous Aphorism

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The men of experiment are like the ant, they only collect and use; the reasoners resemble spiders, who make cobwebs out of their own substance. But the bee takes the middle course, it gathers its materials from the flowers of the garden and the field but transforms and digests it by a power of its own.



ANT  
SPIDER  
BEE

*The New Organon, 1620*



# Francis Bacon's "Four Idols"

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## 1. The idols of the clan.

are deceptive beliefs inherent in the mind of man, and therefore belonging to the whole of the human race.

## 2. The idols of the cave.

are those errors which arise within the mind of the individual. The thoughts of the individual roam about in this dark cave and are variously modified by temperament, education, habit, environment, and accident. Thus, an individual who dedicates his mind to some particular branch of learning becomes possessed by his own peculiar interest and interprets all other learning according to the colors of his own devotion.

## 3. The idols of the marketplace.

are errors arising from the false significance bestowed upon words, and in this classification, Bacon anticipated the modern science of semantics. According to him it is the popular belief that men form their thoughts into words in order to communicate their opinions to others, but often words arise as substitutes for thoughts and men think they have won an argument because they have out talked their opponents.

## 4. The idols of the theater.

are those errors which are due to sophistry and false learning. These idols are built up in the field of theology, philosophy, and science, and because they are defended by learned groups are accepted without question by the masses.



# Critical Thinking: The Challenge-Developing Intellectual Humility



The problem isn't that Johnny can't read. The problem isn't even that Johnny can't think. The problem is that Johnny doesn't know what thinking is; he confuses it with feeling.

— *Thomas Sowell* —

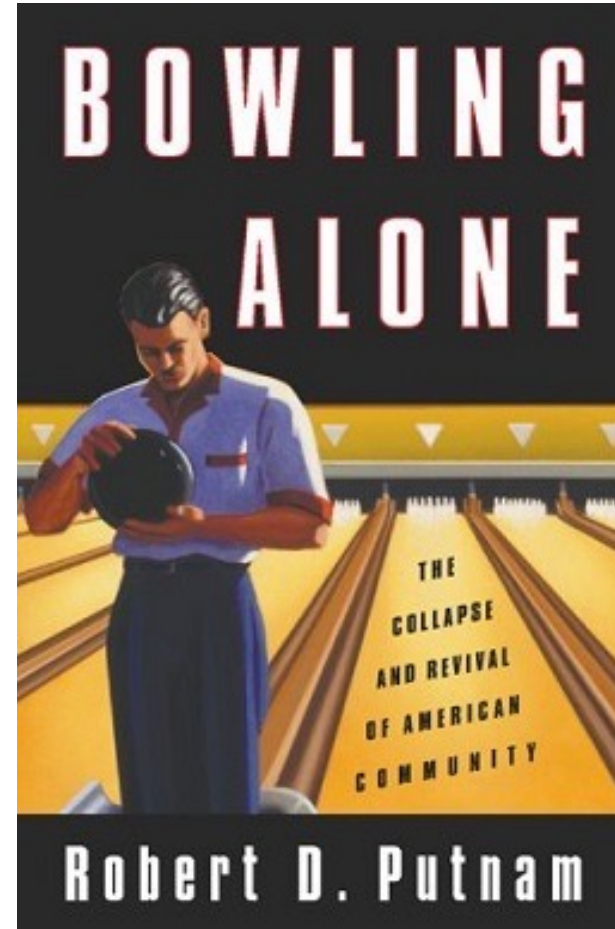
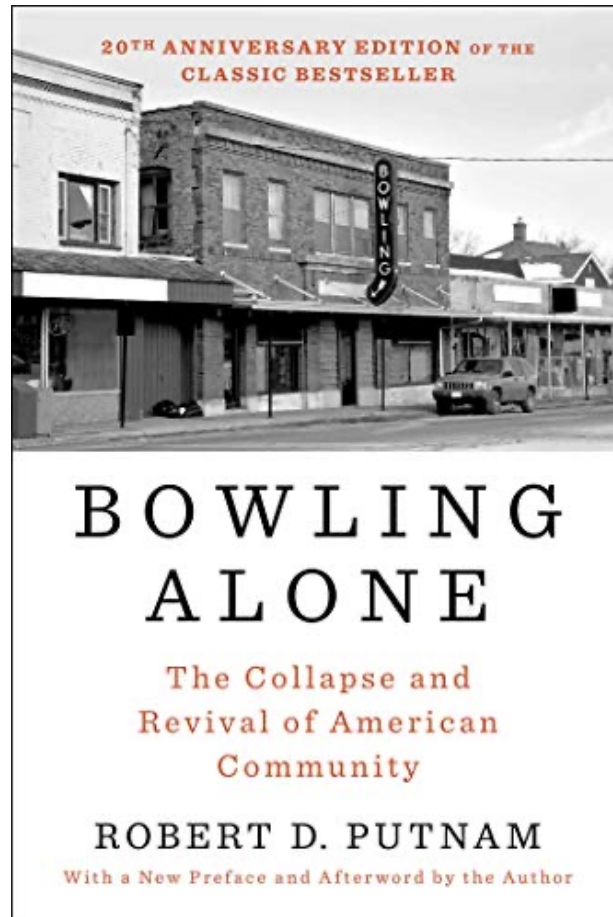
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# Critical Thinking: The Challenge-Developing Resistance to Distractions

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# Critical Thinking: The Challenge-Overcoming Being a “Lone-Wolf”



# Critical Thinking: The Challenge of AI

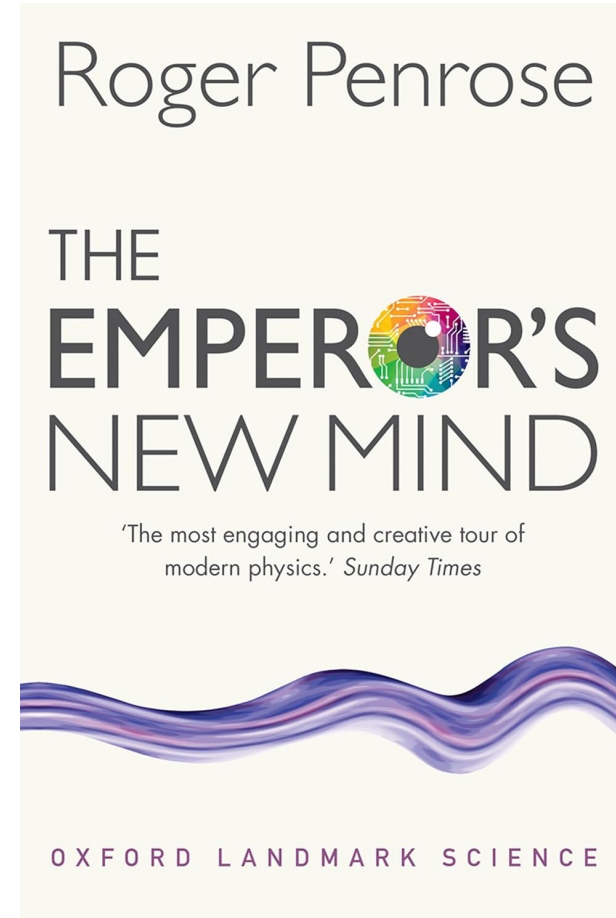
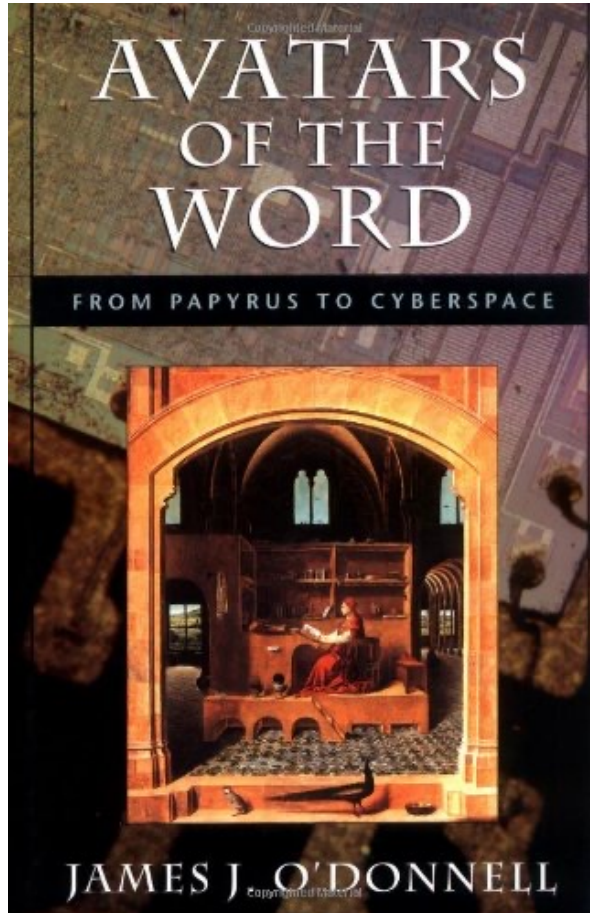
## Teaching with AI

A PRACTICAL GUIDE TO A  
NEW ERA OF HUMAN LEARNING

José Antonio Bowen and  
C. Edward Watson



# Critical Thinking: The Challenge of AI

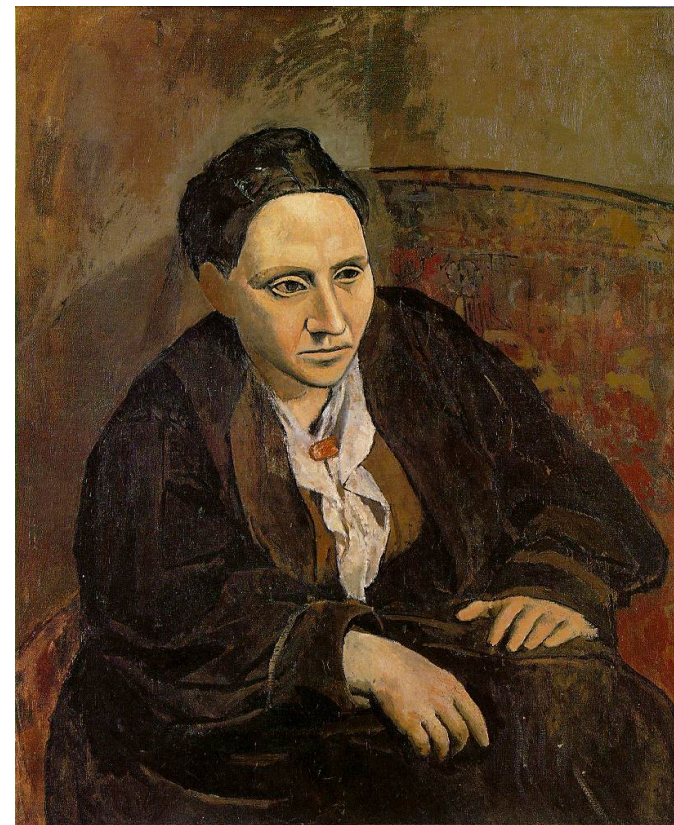


## Critical Thinking: The Challenge

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“It takes a lot of time to be a genius, you have to sit around so much doing nothing, really doing nothing.”

Gertrude Stein, “Everybody’s Autobiography”, 1937



For CT to occur, you need to give students:

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# Space to Think



Think different.™

thinks  
CLEMSON  
*prepare to engage*



# Creative Thinking and Critical Thinking

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*“If I have seen further than others, it is by standing on the shoulders of giants.”*

- Isaac Newton to Robert Hooke

*“No great discovery was ever made without a bold guess”*

- Isaac Newton

# Creative Thinking and Critical Thinking

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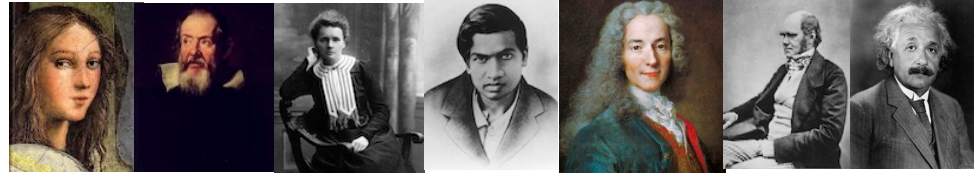


“Genius is 1% inspiration  
and 99% perspiration.”

- Thomas Edison

# Creative Thinking and Critical Thinking

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**Physicists:** Galileo Galilei, Isaac Newton, Max Planck, Niels Bohr, Marie Curie, Albert Einstein, Erwin Schrödinger, Werner Heisenberg, Stephen Hawking

**Biologists:** Aristotle, Charles Darwin, Gregor Mendel, Louis Pasteur, George Washington Carver, James Watson, Francis Crick

**Mathematicians:** Hypatia, Rene Descartes, Blaise Pascal, Isaac Newton, Gottfried Leibniz, George Boole, Kurt Gödel, Srinavasa Ramanujan

**Writers:** Dante Alighieri, Francisco Petrarch, William Shakespeare, Miguel de Cervantes, Voltaire, Mary Shelley, Arthur Conan Doyle, H.G. Wells, George Orwell, Isaac Asimov, Ursula Le Guinn

**Visual Artists:** Leonardo da Vinci, Michelangelo, Leon Battista Alberti, Frederick Turner, Pablo Picasso, Lucian Freud

# Critical Thinking Mindset: Eagerness and Skills

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“A person with a strong *disposition* toward critical thinking has the consistent internal motivation to engage problems and make decisions by critical thinking. Operationally this means three things: The person consistently *values* critical thinking, *believes* that using critical thinking skills offers the greatest promise for reaching good judgments, and *intends* to approach problems and decisions by applying critical thinking skills as best as he or she can. This combination of values, beliefs, and intentions forms the habits of mind that dispose the person toward critical thinking.”

— Peter Facione, Think Critically, Chapter 2.1

# Critical Thinking Mindset: Eagerness and Skills

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“Everyone thinks; it is our nature to do so. But much of our thinking, left to itself, is biased, distorted, partial, uninformed, or down-right prejudiced. Yet the quality of our life and that of what we produce, make, or build depends precisely on the quality of our thought. Shoddy thinking is costly, both in money and in quality of life. Excellence in thought, however, must be systematically cultivated”

— Richard Paul and Linda Elder, Critical Thinking Concepts and Tools, pg. 2

# Critical Thinking Mindset: Eagerness and Skills

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Universal Intellectual Standards:

**Clarity:** Could you elaborate further on that point? Could you express that point in another way? Could you give me an illustration?” Could you give me an example?

**Accuracy:** Is that really true? How could we check that? How could we find out if that is true?

**Precision:** Could you give me more details? Could you be more specific?

**Relevance:** How is that connected to the question? How does that bear on the issue?

# Critical Thinking Mindset: Eagerness and Skills

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## Universal Intellectual Standards<sup>(cont'd)</sup>

**Depth:** How does your answer address the complexities in the question? How are you taking into account the problems in the question? Are you dealing with the most significant factors?

**Breadth:** Do we need to consider another point of view? Is there another way to look at this question? What would this look like from the point of view of X?

**Logic:** Does this really make sense? Does this follow from what you said? How does that follow?

**Fairness:** Are we considering all relevant viewpoints in good faith? Are we distorting some information to maintain our biased perspective? Are we more interested in our vested interests than the common good?

— Richard Paul and Linda Elder, Critical Thinking Concepts and Tools, pgs. 8,9

# High-Impact Teaching Practices

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## ***Critical Questions***

- How can HIPs help students become intentional learners?
- What do you want to accomplish by focusing on the design and development of HIPs? What are the outcomes?
- What HIPs currently exist on your campus or in your program?
- What do you know about who participates?
- Who has access? Who doesn't?





Whereof one cannot speak, thereof  
one must be silent.

— *Ludwig Wittgenstein* —



What we can't say we can't say, and  
we can't whistle it either.

— *Frank P. Ramsey* —

AZ QUOTES

# Thank You!

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Please visit our web site for further information:

<http://www.clemson.edu/thinks2>

